

Luminescence Monitor **User Guide**

6-13-06 D. Gassner

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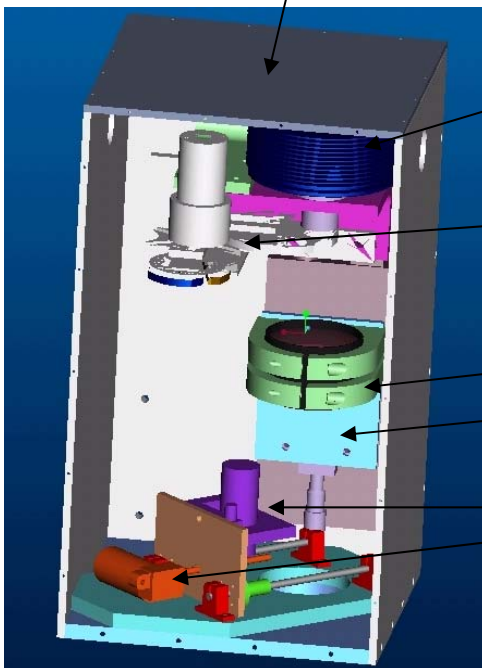
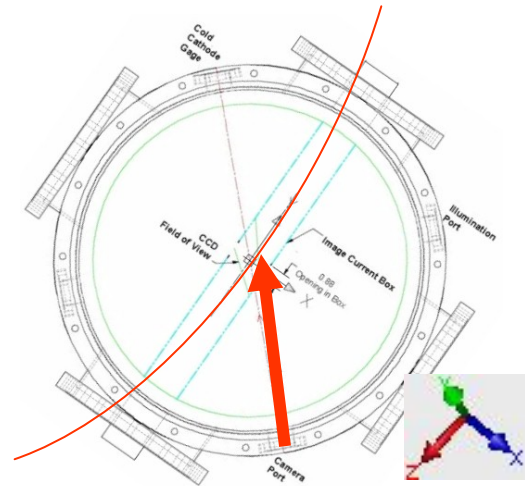
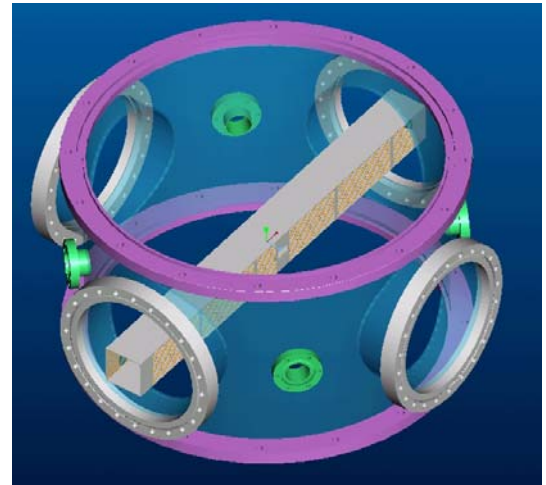
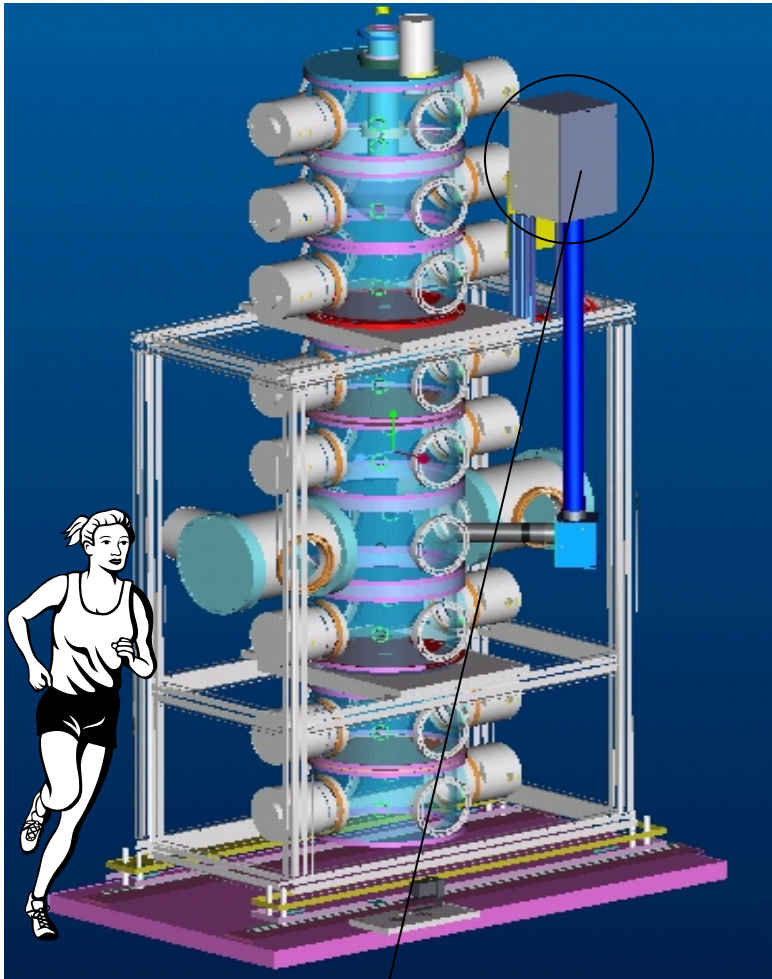
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Detector Layout



Meade Camera head

Multi-position lens/filter Assy.

**Optics lens on
moveable stepper stage**

**Spectrometer head on
plunge stage**

Before attempting to acquire data:

Read & become familiar with the system by reading this entire document.

Ensure the RHIC beam is on.

Ensure the H-Jet is on.

PET Pages:

Here is a good place to check RHIC beam & H-Jet status.

Pet: RHIC/Instrumentation/dcctWcm

Instrumentation/dcctWcm			
Page	PPM	Device	Data Tools Buffer
		BLUE	YELLOW
DCCT	39.697	348,034	$\times 10^9$ Ions
WCM	42.144	113,307	$\times 10^9$ Ions
Bunch Length	9.21	3.88	nsec
WCM Mode	Injection	Injection	
Trigger	13:29:56	13:29:56	
New Data	13:29:55	13:29:59	
LifeTime	0	6414	s
# bunches	1	6	
Next bucket	1	301	
Rev. time	12.798	12.798	usec
Dipoles	463	463	Amps
Injection	12:29:51	12:03:24	scope time
(1.1) "text" Nudge: 0			
buffer.			
Tue Feb 28 13:28:38 2006: Get and Async requests complete			
2006: Value sent for (15.2)			

To check the status of the system & control the system optical focus, Filter wheel, AC power to Meade camera controller & local tower computer go to:

Pet: RHIC/Instrumentation/H-Jet/Lumi-Monitor

If the IG06 gauge (see below) readback in the -08 range there is a good chance the H-Jet is on. If it reads in the -09 range it is likely off.

H-Jet/Lumi_Monitor									
Page	PPM	Device	Data	Tools	Buffer				
Filter Position	0	Blank							
	1	Wide Angle							
	2	Polarized Hor.							
	3	Polarized Ver.							
	4	Near IR Filter							
	5	656nm BP Filter							
Geneva Drive									
Jet-Camera-Filter-Control	output value:	0	nextPosition						
Jet-Camera-Filter-Control	home:	0							
Motion	step cmd	step rdbk	speed (steps/sec)	STOP	stepper cmd	at Limit?	Home		
HJet_Camera_Lens_Focus	-21500	-21500	500	panic	WY	No	home		
Outputs									
Jet-Meade-Camera-Reset	On	1							
Jet-Computer-Reset	On	1							
PortSts									
HJet-IG06-Gauge	Active	Pressure	1.1E-08	Desired	< 3E-8				
Check IG06 Gauge for	Pressure in	-08 range to	ensure jet is on.						
Beam Camera Image:									
bic.jet	/home/cfsb/hjet/arc	512	768	dumpImage					
bic.jet	[380 397 353 14 476 [880 726 754 767,								
RHIC Lumi Spectrometer									
Control and		Monitor							
Move Spectrometer	Position [Text]	Position [value]							
R-Lumi-Spec-Mot-Cnt1	MoveOut	Out	2						
(1.2) "text" Nudge: 0									
Tue Apr 25 13:02:57 2006: copying parameter values to buffer.									
Tue Apr 25 13:02:58 2006: Get and Async requests complete.									

Camera & Computer Remote On/Off

Digital output bits are assigned to control separate 120VAC power sources for the Camera and the computer. These controls are available on the Lumi_Monitor pet page. The

camera system executes an automatic boot up sequence upon power-up. The computer is configured to fully boot automatically which takes a few minutes.

The camera & computer should be turned on using the boot sequence described below. They should both be turned off after the imaging effort is completed. Leaving the camera on can reduce the lifetime of the camera.

If the camera & computer is off:

Start-up/boot sequence:

Turn on the camera first, wait a minute then turn on the computer. The camera will power up quickly enough so that when the PC is ready to configure its SCSI port to look for the camera it will be ready. Wait a few minutes for the PC to completely boot before trying to connect remotely.

Remote Desktop to PC in tunnel:

Presently to control the camera from outside the tunnel one must connect to the computer in the tunnel via a PC running Windows XP. The name of the computer is seal.pbn.bnl.gov. Login as "dejan", password "Kragujeva*".

Only one person can be logged in at a time due to the Windows XP Remote Desktop limitations.

Important:

After a reboot or turn-on, if you see the pop-up window for the "Hardware Installation Wizard" attempting to install the SCSI device, hit **Cancel** or else the computer will think there are multiple SCSI devices attached.

Remember to log out when you are finished with your session ("Start" button lower left, then "Log Out").

Focusing:

Optics focusing is controlled by changing the position of the lens near the camera head. This is done with a stepping motor stage with a full range of about 10cm's. The Klinger stepper driver is controlled by the pet page, 100,224 steps is full range, thus a single step is about 1 micron.

Type step commands in the "step cmd" field on the pet page, wait until the "step rdbk" field matches to ensure motion has stopped.

Focus Positions:

(From "lower" stage limit = 0)

Near Wires: -17,000 (17.000mm)

Jet Center: -21,800

Far Wires: -23,800

Cathode Gage: -28,100 (on the opposite side of the chamber)

Home button:

This will automatically fully retract the motion stage and set the "step rdbk" to zero. This should only be used to re-establish a position reference if you do not believe the "step rdbk" indication.

IG06 vacuum gauge

The HPS cold cathode gauge is on the opposite side of the jet vessel from the viewing port, it emits a small amount of light.

Filter Wheel Control:

To move to the next position, hit one (center mouse) click at a time and slowly, wait at least a few seconds between moves. The number in the "output value" field corresponds to the filter position in the table at the top of the pet page. The "home:" field will display a zero only

when the Blank is in position, otherwise a 1 will be displayed. If the position of the filters is suspicious, then continue to click the “next position” button until “output value” zero position matches the “home:” zero.

There are three band pass filter in the filter wheel, they are used to measure the hydrogen characteristics by viewing two Balmer lines:

$n=3$, $\lambda = 6560 \text{ \AA}$ α , color emitted: red

$n=4$, $\lambda = 4860 \text{ \AA}$ β , color emitted: bluegreen

And the molecular line at 320nm.

See the detailed band pass filter transmission curves from Andover Corporation at the end of this paper.

Meade 416XTE Camera:

Be careful using the camera, know what you are doing, there is a Meade Users Guide on line at:

<http://www.meade.com/manuals/pictor/index.html>

We also have a (hardcopy) available for reference.

Remember to follow the turn-off sequence when you are done (see below).

Pictor 7.25 Camera Software:

Run the Pictor 7.25 version of the software via Remote Desktop on the PC in the tunnel (available as a shortcut on the Desktop).

After starting the program from the shortcut on the Desktop, click the “Connect” menu and release on Connect to begin communication to the camera.

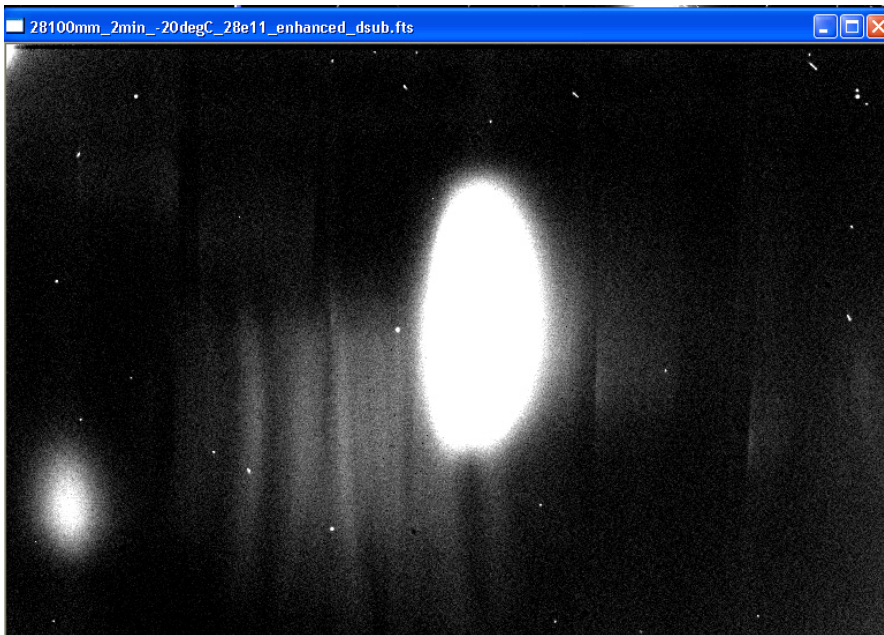
Typical image is 768 X 512 pixels, keep analog binning OFF to maximize resolution.

Beam Images:

The Camera head is oriented at 90 degrees so the vertical and horizontal axis is interchanged. The image below is taken without a dark frame subtracted, it shows the fluorescence from the yellow beam crossing the H-Jet as the bright spot in the middle, and the blue beam at the lower left. Actually the blue beam is offset horizontally & vertically from the yellow, and only a portion of the blue beam is passing through the H-jet.

30 second integration, 109 proton bunches, 100GeV.

The cross hairs super imposed on the image are located on the center pixel of the CCD chip. The actual vertical beam line center we calculate at about 1.3mm higher than the CCD center. The CCD has 768 vertical pixels, and 512 horizontal. Due to the viewing angle, the horizontal is corrected by a factor of about 1.414. Conveniently, the resulting image is appears to be nearly square.



Saving files:

(This includes opening files, and recalling images to subtract as dark images.)

There is a folder set up on the seal.pbn.bnl.gov computer for saving Luminescence Monitor images, it can be found at:

Local Disk (D:) / Documents and Settings/All Users/Shared Documents/CAMERA SHARED PICTURES

Software tip:

Remember to type in the file format extension to the file name when you save files.

Example: Test Image 2-16-06.fts

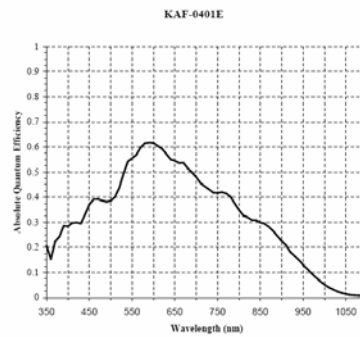
Using the .fts image format is the preferred method of saving files, this format includes more image data than others & stores the camera & software configuration for each image.

Camera Turn-off Procedure:

When you are finished using the camera, click on the button with the "X" on the top toolbar (near the middle) of the Pictor 7.25 window. A pop-up will appear telling you that you can now exit the program. Exit the program by the File pull down menu, then Exit.

4.2 Typical Performance Characteristics

Spectral Response



Meade 416XTE CCD spectral response.

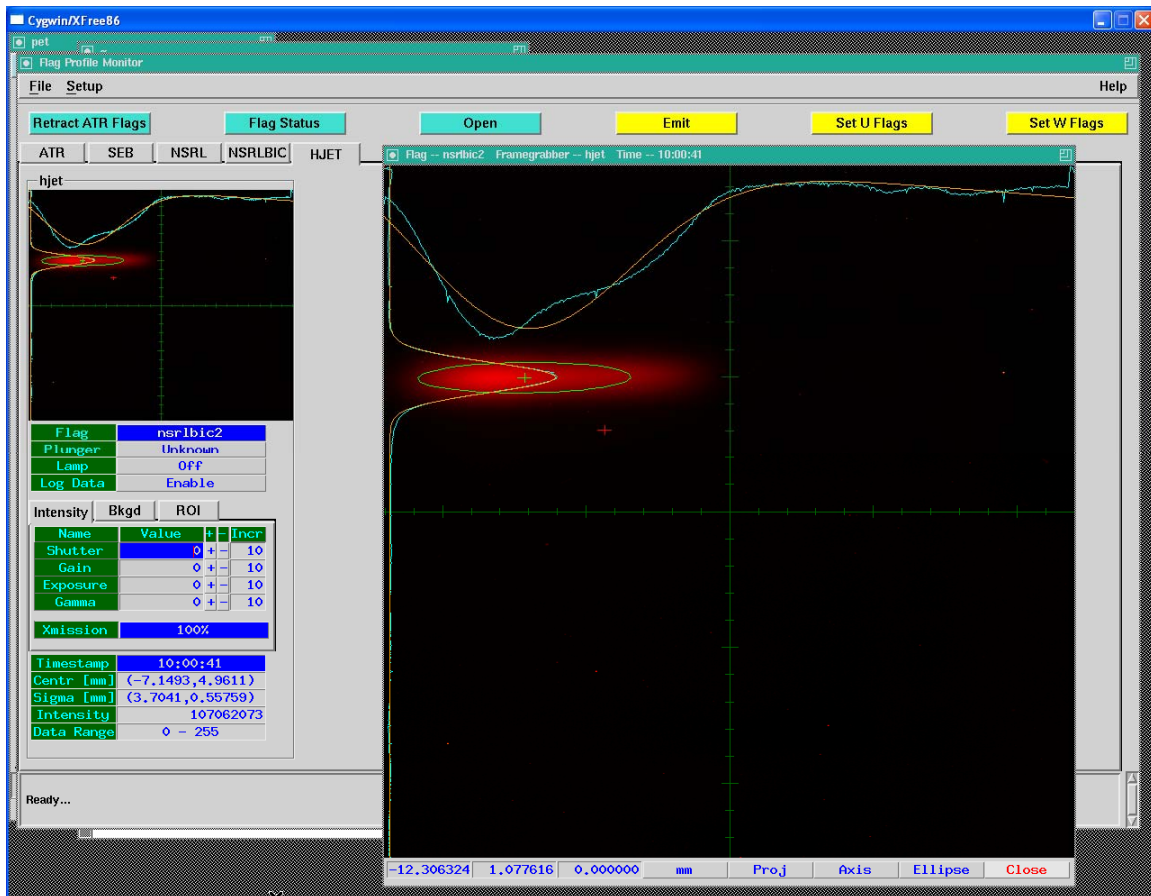
Troubleshooting tips:

If things are not working, it is possible to AC power reset the PC & camera from pet as a last resort.

Start-up/boot sequence:

Turn on the camera first, wait 30 seconds, then turn on the computer. The camera will power up quickly enough so that when the PC is ready to configure its SCSI port to look for the camera it will be ready.

Analyzing Images:**Displaying Images via FPM**



A script written by Bob Olsen "[Jet Beam Imaging Camera File Transfer](#)" is a script that monitors the file:

```
/home/cfsb/hjet/xfile.fts
```

Which is found via this path from the PC (named "Seal" in the tunnel at the 12 IP:

```
hjet on "C-adnfsgw1/xfile.fts"[H:]
```

This is the file that users of the Windows camera application (Pictor 7.25) should write to (Network drive "H") if they want an image to be archived and viewable by Steve Tepikian's FPM application.

When the script is running, it constantly polls to see if the xfile.fts is new, if so it converts it to the pgm format (pgm = portable graymap format) which is what the FPM application needs, and a copy of which is named according to a timestamp and archived in the /home/cfsb/hjet/archives directory.

[Jet Beam Imaging Camera Manager](#) is the ADO manager which gets the results of the script's conversion and Steve's FPM application waits for changes to parameters it administers.

Both the script "[Jet Beam Imaging Camera File Transfer](#)" & "[Jet Beam Imaging Camera Manager](#)" can be started, stopped, & checked via StartUp/Start/Servers/RHIC Managers.

If the fields to the right of the bic.jet lines on the Lumi-Monitor pet page are pink, you may have to stop & restart the manager &/or script mentioned above.

More info from Bob Olsen:

Here are steps you should take to determine if my parts of this system are functioning properly.

1- Make sure my manager is running and responsive. Type

```
adoIf bic.jet loadfile
```

This should come back and it should show the name of the last file it was told was an update. The name of the file has date information in it, so you can tell if it's recent. If the adolf command doesn't come back at all you should restart the manager. You can do this in StartUp. The manager is under **Servers->Rhic Managers->Jet Beam Imaging Camera Manager**.

2 - If the file isn't as recent as you expect you should check to see if the manager is getting update notifications. Type

```
adoIfA bic.jet loadfile &
```

This will start waiting for asynchronous updates, much like what Steve's Manager is doing. Then type

```
touch /home/cfsb/hjet/xfile.fts
```

This simulates what happens when the proprietary window application writes the file. Type

```
ls -al /home/cfsb/hjet/xfile.fts
```

to make sure that the date has changed. If it hasn't, there may be a problem with write permissions to this file or the directory that it's in.

3 - If you don't see a message on the screen showing a new loadfile name within a minute or so of touching the file, you may need to restart the script which monitors this file and sends the updates to my manager. This can also be done using StartUp. The script is found at **Servers->Rhic Managers->Jet Beam Imaging Camera File Transfer**.

I needed to restart the script this morning.

I will leave it to Steve to describe how to check his components.

I have updated the wiki with the information written above here:

http://www.cadops.bnl.gov/Controls/ControlsWiki/index.php/Luminescence_Monitor

Alternative Image Viewer:

There is an image processor program available called DS9 Viewer that is better than the Pictor 7.25 for analyzing the frame grabbed images with the .fts format. It can be downloaded for free from the following web site:

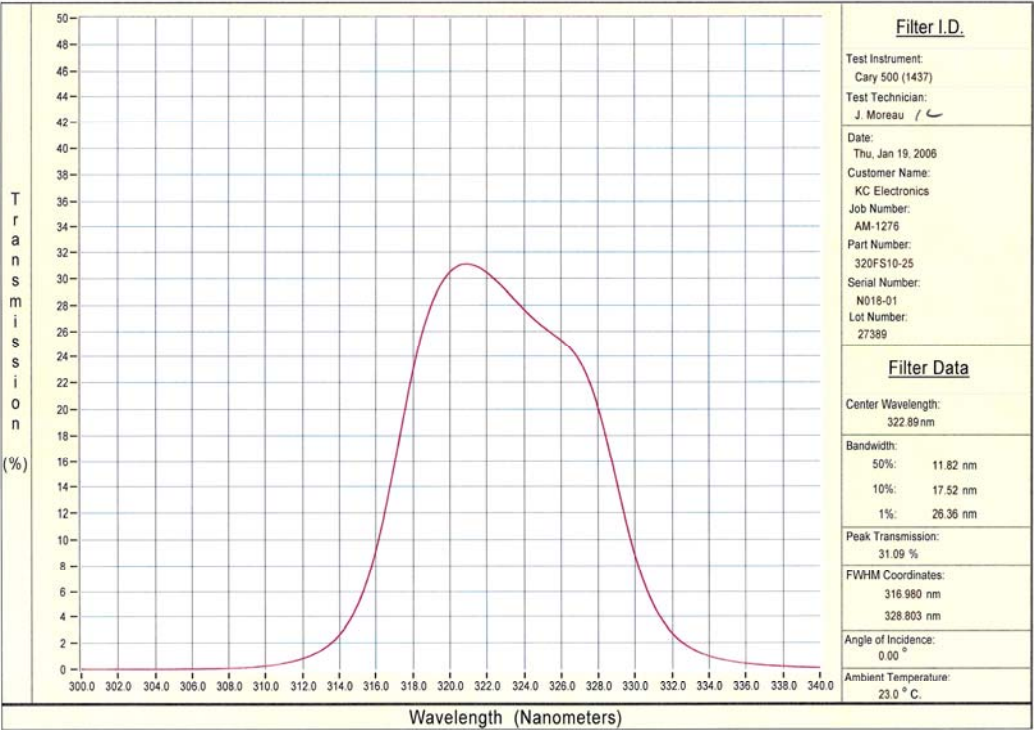
<http://hea-www.harvard.edu/RD/ds9/>

Note: After opening a .fts file, click SCALE and select 90% or so to see the image (I believe this is a light scale, not size).

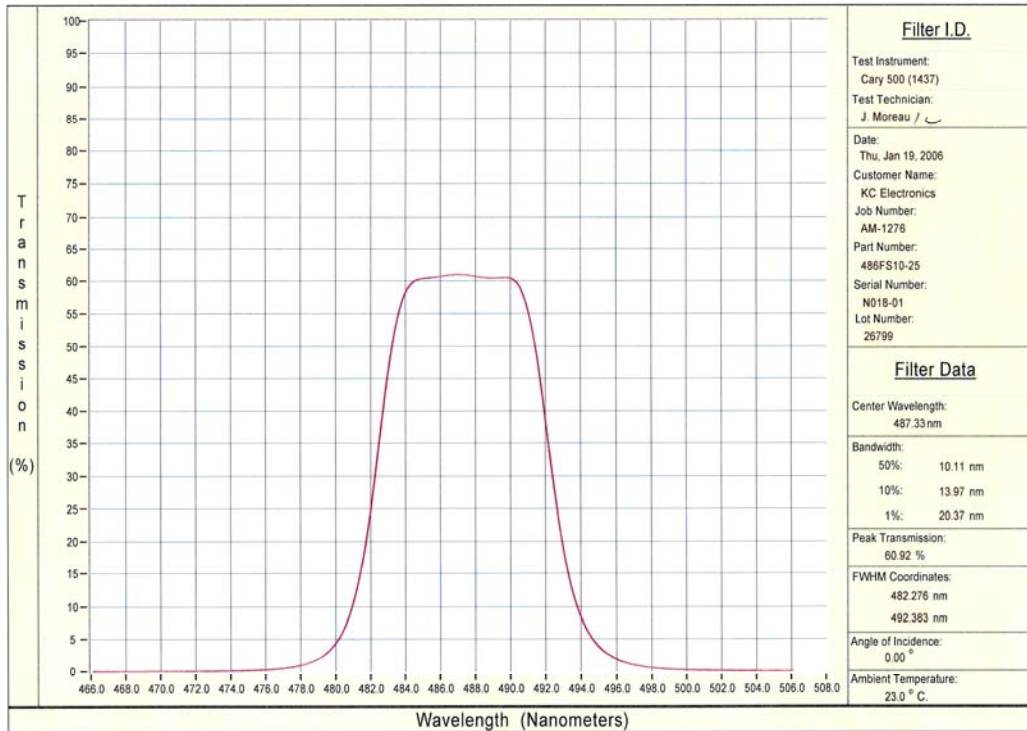
From there you can use the menu options to manipulate the image data as needed.

Band Pass Filter Transmission Curves:

Andover Corporation



Andover Corporation



Andover Corporation

